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AUTHOR DeWitt, Jerald R., Ed.
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ABSTRACT

This manual provides information needed to meet specific standards for certification as a pesticide applicator. The text discusses methods to prevent the introduction and/or spread of pests and diseases through application of suppression, control and eradication. (CS)

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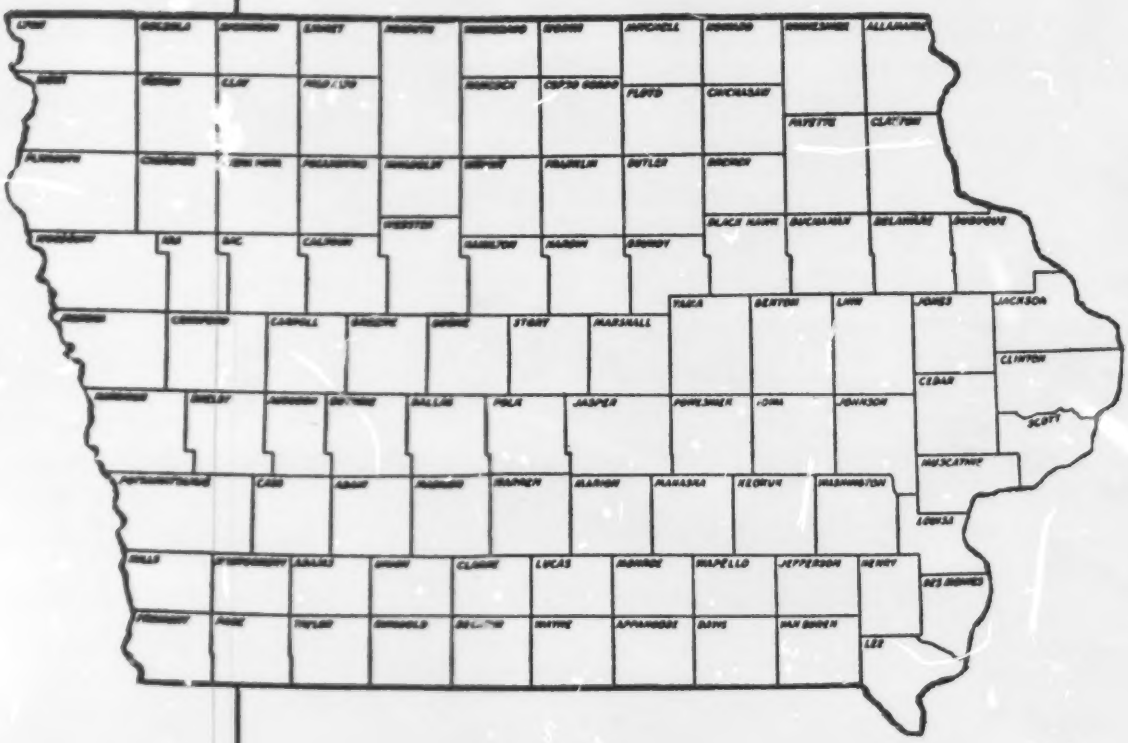
COMMERCIAL PESTICIDE APPLICATOR MANUAL

CATEGORY 9

REGULATORY
PEST CONTROL



This manual is to be used for certification training in conjunction with the U. S. Department of Agriculture - U. S. Environmental Protection Agency manual, Apply Pesticides Correctly, EPA-335.

Cooperative Extension Service
IOWA STATE UNIVERSITY
Ames, Iowa 500[illegible]

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This manual has been developed for individuals wishing to become certified in commercial pesticide applicator Category 9, Regulatory Pest Control. It contains specific information that an individual must know before becoming certified in Category 9. The manual has been designed to supplement the general information contained in the core manual, Apply Pesticides Correctly - A guide for commercial applicators (plus an Iowa State University supplement) and should not be used for certification preparation without referring to the core manual as well.

CONTENTS

INTRODUCTION	2
REGULATORY PEST CONTROL	2
Statutory Authorities	3
The Federal Acts	4
PESTS	7
Japanese Beetle	7
Gypsy Moth	8
Cereal Leaf Beetle	8
Soybean Cyst Nematode	9
Barberry	10
FACTORS INFLUENCING PEST SPREAD	11
Pest Introduction	11
Pest Spread	11
Population Dynamics	12
PRINCIPLES OF CONTROL	13
Prevention of Entry	13
Eradication	14
Retardation and Mitigation	14
METHODS OF CONTROL	15
Proper Pesticide Usage	15
Avoiding Harmful Residues	15
Environmental Concerns	16
PESTICIDES	17
Organochlorines	17
Organophosphates	18
Herbicides	18
Fumigants	19
SPECIAL SITUATIONS	20

Edited by Jerald R. DeWitt, pesticide training coordinator, who expresses appreciation to the University of Georgia and the College of the Virgin Islands for use of source material.

INTRODUCTION

The U. S. Environmental Protection Agency has set the following standards for certification in the category of Regulatory Pest Control:

"Applicators shall demonstrate practical knowledge of regulated pests, applicable laws relating to quarantine and other regulation of pests, and the potential impact on the environment of restricted-use pesticides used in suppression and eradication programs. They shall demonstrate knowledge of factors influencing introduction, spread and population dynamics of relevant pests. Their knowledge shall extend beyond that required by their immediate duties since their services are frequently required in other areas of the country where emergency measures are invoked to control regulated pests and where individual judgments must be made in new situations."

REGULATORY PEST CONTROL

The objective of regulatory pest control is to prevent the introduction and/or spread of pests and diseases through the application of suppression, control and eradication pest control methods. The objective is achieved through limiting movement of commodities and materials and the treatment of commodities, materials and the environment for the purpose of preventing the establishment of pests and diseases where they have not been previously established. An organism can become a regulated pest when it interferes with:

--health
--comfort
--leisure
--aesthetic satisfaction
--recreation
--stability of existing biological systems
--agricultural and material production

Organisms which may be considered pests include:

--insects
--nematodes
--fungi
--weeds

--diseases

--vertebrate animals

--other organisms as defined in the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended.

Regulatory pest control measures include but are not limited to the following:

--the pest offers an actual and expected threat

--a substitute action which is less disruptive if normal trade is not available

--the objective must be reasonably attainable

--the economic gains outweigh the costs of application of the control measures.

Statutory Authorities

One of the principal reasons for the spread of pests and diseases shipped throughout the world is inadequate control of such pests in the country of origin. Regulations cannot prevent, though they may hinder or delay, the spread of pests to new territories. Adequate control of pests in countries of origin is the best safeguard against their spread to other countries including the United States. Although this principle is widely accepted, the practical application is very slow. In the meantime, we must continue to depend on laws and regulations to protect against outside pests and to control pests within our borders.

The existence and responsibilities of Federal regulatory programs are provided for by congressional acts and by delegations made by the Secretary of Agriculture. The acts provide the Secretary of Agriculture with authority to:

--establish restrictive and prohibitory quarantines and regulations against imports likely to introduce pests not known to be present or widely distributed in the United States.

--establish quarantines and regulations to carry out cooperative Federal-State-Mexican suppression, control or eradication measures against designated pests which become established in the United States or Mexico

--provide certification of domestic products for export when requested by interested shippers or other parties.

The acts and regulations based on them provide a foundation for a flexible but effective program for protecting the country against foreign pests. Under the acts, the USDA has broad authority to take appropriate measures against threatening pests and to promulgate or modify existing regulations whenever necessary.

The Federal Acts

I. The Plant Quarantine Act (August 20, 1912)

The powers of restriction on imports granted under this act are broad, and it would seem to be clear that Congress intended to give the Secretary authority to restrict and control the entry of plants and plant products to the extent necessary to prevent the entry of plant pests. Sections 1 through 7 are the basis for the quarantines established on foreign plants and plant products.

Eighty-five quarantines have been promulgated under the Act in the 60 years of its existence. Thirty of these have related to imports of plants and plant products from foreign countries, 45 to interstate movement and 10 to movement of host material between the United States mainland and its offshore states and territories. Currently, there are 11 domestic quarantines, 14 foreign quarantines and 7 territorial quarantines.

The Act has been amended five times since it was enacted in 1912. The fifth and last amendment to the Plant Quarantine Act was made May 1, 1928. This amendment granted authority to stop--and without warrant--to inspect, search and examine persons, vehicles, receptacles, boats, ships or vessels and to seize and destroy or otherwise dispose of plants and plant products or other articles found to be moving or to have moved in interstate commerce or to have been brought into the United States in violation of the Act of 1912, or of any quarantine order thereunder.

In 1929, a proposed amendment to the Act would have deprived the Secretary authority to forbid the importation of nursery stock, fruits, vegetables and other plant products unless such items were infected or infested with foreign plant pests or unless the Secretary had good reason to believe such pests were present. Since inspection

alone cannot determine the presence of such pests, the Department strongly opposed the bill. On September 18, 1929 after an extended Senate discussion, the bill was dropped by common consent. There has been no serious challenge to the Act since that date.

II. Federal Plant Pest Act (May 23, 1957)

One of the purposes of the enactment of this act was to provide the USDA authority to regulate the movement of plant pests into or through the United States. A definition for plant pests was included in the Act and exparded to cover diseases, mollusks, viruses and nematodes as well as insects.

Authorization was given the inspector to take emergency action to seize, treat, or destroy articles or products with respect to plant pests new to or not known to be widely prevalent in the United States. It provided that the least drastic actions be taken to prevent spread of plant pests--destruction, exportation, or return to point of origin. Provision was also made for the payment of compensation to the owner for losses due to disposal of products, articles, means of conveyance or pests. The act provided for such payment only if the owner established in court that the disposal was unauthorized by this act or the Plant Quarantine Act.

This act also authorized inspection without a warrant of persons and means of conveyance moving interstate on probable cause of threat of spread of a plant pest. The Act also included provisions for entry of premises with a warrant to make any inspections and seizures necessary under the Act. Violation of regulations is covered by this act, as well as violation of the Act itself, and a penalty is authorized for violation of the regulations as well as violation of the Act.

III. Organic Act of September 21, 1944

The original Organic Act of 1944 was enacted to give the Secretary of Agriculture authority to cooperate with farmers' associations and individuals, as well as states or political subdivisions thereof, and Mexico, in operations to control or eradicate Japanese beetle, sweet potato weevil, Mexican fruit fly, citrus canker,

gypsy moth, browntail moth, Dutch elm disease, phony peach and peach mosaic, cereal rust, corn borer, pink bollworm and thurberia weevil.

In addition, the Act gave the Secretary authority to inspect and certify domestic plants and plant products as meeting foreign sanitary requirements. This latter authority had previously been granted annually by successive appropriation acts. The Act was amended in 1949 to include citrus blackfly, whitefringed beetle and Hall scale. In 1957 it was further amended by including imported fire ant, soybean cyst nematode and witchweed.

An important part of the 1957 amendment adds to the existing law the words "insect pests, plant diseases, and nematodes, such as . . ." This language, according to legislative history, was intended to have the effect of permitting the Department to undertake eradication or control campaigns against insect pests coming within the same description of those listed within the section without in each case an amendment of the Act to so provide. The Act, when promulgated in 1944 gave the Secretary the authority to certify plants and plant products for export certification. Prior to the Act, there had been a charge by the Department for such certification. This was required by each appropriation authority.

Since there were no requirements for collection of fees in the 1944 Act, the collection of such fees was suspended beginning July 1, 1945.

IV. The Federal Noxious Weed Act of 1974

The purpose of the enactment of this act provides for the control and eradication of noxious weeds and the regulation of the movement in interstate or foreign commerce of noxious weeds and potential carriers thereof, and for other purposes. No person shall knowingly mail, ship, offer for shipment, offer for entry, import, receive for transportation, carry, or otherwise transport or move, or allow to be moved, by mail or otherwise any noxious weed unless such movement is authorized under general or specific permit from the Secretary of Agriculture. The Act also provides for power of temporary quarantine and restriction or prohibition of interstate movement of any products and articles capable of carrying noxious weeds whenever the Secretary has reason to believe that an infestation of noxious weeds exists in any state, territory or district.

PESTS

JAPANESE BEETLE[a/]

The Japanese beetle is presently found in Iowa. Although in recent years it has been detected in both Linn and Scott counties, it has successfully established in only a small area of Linn County in Cedar Rapids.

Description

Japanese beetles are a little less than 1/2 inch long and are a shiny, metallic green. They have coppery-brown wings and six small patches of white hairs along the sides and back of the body under the edges of the wings. The immature form is a white grub that is similar to our native white grub but is usually smaller--only about one inch long. It lies in the soil in a curled or C-shaped position.

Life Cycle

Adult beetles first appear in late June in Iowa. They fly only in the daytime and are extremely active for only 4 to 6 weeks. Female beetles burrow about 3 inches into the ground, usually turf, and lay eggs. The eggs hatch in August, and the small grubs feed on plant roots through the fall. The beetles feed on plant foliage. The grubs are almost full grown by late fall and burrow about 4 to 8 inches below the soil surface where they overwinter in an earthen cell. During the following spring, the grubs move upward to the roots, pupate and emerge as adults in June.

Damage

Grubs feed on roots, particularly grasses. Beetles feed on more than 275 different plants. They often congregate on flowers or fruits of plants exposed to bright sunlight. Beetles chew out the tissue between the veins leaving a skeleton.

Natural Controls

Weather, disease and parasites often help reduce Japanese beetle populations. Extremely dry weather destroys many eggs. Wet summers, however, are very favorable for egg and grub development.

a/ Popillia japonica

GYPSY MOTH[a/]

The gypsy moth is a serious pest of trees in northeastern United States. A single male moth was detected in Iowa in 1973. No known infestation of this pest exists in Iowa although gypsy moth has been detected in several Illinois counties.

Description

Female moths are white with black wing markings and do not fly. Males have dark brown forewings and a 1 1/2-inch wingspread. Males are strong fliers. Larvae are large, hairy caterpillars that display pairs of red and blue dots on their backs.

Life Cycle

The gypsy moth overwinters in the egg stage attached to leaves, stones, rocks or shaded objects. Larvae hatch in April or May. In June, larvae pupate, and the adult moths emerge in 10 to 14 days.

Damage

Only the larval stage is destructive. They will feed on leaves of forest, shade and fruit trees and on ornamentals. Single defoliations may kill conifers while hardwoods may survive an initial defoliation. Larvae usually strip all leaves from the tree.

CEREAL LEAF BEETLE[b/]

The cereal leaf beetle is a destructive pest of wheat, oats, barley and other small grain crops. Although it has not been detected in Iowa, it is present in Illinois.

a/ Porthetria dispar

b/ Oulema melanopus

Description

The adult beetle is about 3/16 inch long with metallic, bluish-black wing covers and head. The legs and front segment of the thorax are reddish. The larva is slightly longer than the adult. The body is yellow with brownish-black head and legs. The larva is frequently covered with fecal material.

Life Cycle

Overwintered adults appear in early spring. Mated females lay eggs on leaves of the host plant. Larvae feed on the leaves but drop to the soil where they pupate. Summer adults emerge and feed until fall. They hibernate in field debris or soil crevices until spring.

Damage

Both adults and larvae damage grain crops. They feed on the leaves, chewing out long strips between veins. Heavy feeding gives plants a yellowish-white frosted appearance.

SOYBEAN CYST NEMATODE[a/]

The soybean cyst nematode is a destructive pest to roots of soybeans, lespedeza and other crops. It has not been detected in Iowa although it is present in Missouri.

Description

Nematodes are small, worm-like creatures. Their life cycle is similar to insects, with an egg, larva and adult stage. Both larvae and adults are light-colored and barely visible.

Life Cycle

Larvae hatch from eggs and burrow into roots of the host plant. While feeding on roots, they inject digestive chemicals into them causing stunted or yellow plants.

a/ Heterodera glycines

Larvae mature in roots. Adult males leave the roots and live in the soil while the female remains in the root. As she feeds, her body swells and eventually splits the root. After mating, the female lays some eggs but eventually dies with many eggs within her body. The carcass darkens from yellow to brown and becomes a cyst. It remains viable for years and is resistant to decay. Cysts are easily spread in soil that clings to roots, crops, machinery and containers.

Damage

Damaged plants may become yellow and stunted. A severe infestation can destroy a crop.

BARBERRY[a/]

Barberry is a shrubby perennial found in Iowa that is an alternate host for black stem-rust of wheat and other cereals.

Description

Barberry has woody, branched stems forming shrubs 1 to 3 inches high. The wood and inner bark are yellow. The leaves are simple with toothed margins. They are alternate on the long twigs of the season and are reduced to 3-branched spines in late fall. Flowers are in drooping axillary racemes with 6 separate sepals and petals. The fruit is an ellipsoid red berry.

Life Cycle

Barberry is a perennial that reproduces by seeds and new shoots from spreading roots.

a/ Berberis vulgaris

FACTORS INFLUENCING PEST SPREAD

PEST INTRODUCTION

During the late 1800's, a number of disastrous pest introductions into the United States dramatized the need for regulatory action. Prior to this time, man regarded the introduction and spread of pests as unavoidable. However, as man's scientific knowledge advanced, he soon learned that many organisms which are of no serious consequence in their native habitat would become serious pests when introduced into new areas. Cultural or environmental conditions, the presence of diseases, natural predators and parasites, and other factors may keep an organism at levels where no significant damage is caused. However, when that organism is introduced into a new habitat, the natural controls are not present and it may become a pest. The possibilities of introduction of pests into new areas have been enhanced considerably because man has increased the speed and frequency of his world movement and the quantity and variety of material being transported.

PEST SPREAD

In discussing pest spread, it is important to distinguish between natural spread and artificial spread. Natural spread is the movement the pest is capable of making without the assistance of man. Artificial spread is the unnatural movement of a pest by man. The introduction of 80 pairs of starlings into New York in 1890 is an instance of artificial spread as the birds cannot cross large water bodies on their own. However, the complete invasion of the country by starlings starting around World War II was accomplished by the birds' natural movements to occupy this new ecological niche.

For most pests, the major avenue of long distance spread, and certainly intercontinental movement, is associated with the movement of man. Prevention of this artificial spread is one objective of pest regulatory programs.

The introduction of an organism into a new area does not ensure its establishment. A number of factors may be involved in its becoming established:

--introduction must be into a favorable environment such as the availability of an appropriate host or food source during a specific season.

--species requiring alternate hosts must arrive in a location where both hosts occur in the proper sequence.

--the pest must be physiologically sound and in numbers sufficient to allow for natural attrition from environment factors thus permitting reproduction.

If every entry of a pest were to establish an infestation, regulations and quarantines on the movement of materials would be impractical because it would be impossible to intercept every infested lot of material. Regulatory programs attempt to reduce the movement of infested materials to such a low level that the likelihood of establishment of the pest in new areas is minimal.

POPULATION DYNAMICS

In order to evaluate the potential seriousness of a pest, it is necessary to have considerable information about the environmental requirements of the pest. Regulatory programs are generally concerned with controlling the entire population of the pest species.

Major characteristics of pest populations important to consider when regulatory programs are being designed include:

--population densities
--age distributions
--reproduction and mortality rates
--biotic potential and growth

Control or eradication programs must consider all life stages at which the organism becomes the pest. It is necessary to know what effect such factors as pesticides, parasites, predators and host resistance have on all stages of the pest organism. However effective a factor may be against a given stage of a pest,

its long-term value is limited if it does not account for significant decreases between generations. For example, even if a high percentage of the larval stage of a pest is killed by control techniques, the remaining reproductive population may have the potential for significant damage or spread by the next generation of the pest.

Studies of life cycles can often identify critical life stages and other factors important in producing population changes. Recognition of these key factors and their influence on pest populations may permit development of controls which may have significant impact in reducing the populations. These factors which normally have an important limiting effect on native pest populations may include resistance of host material to the pest, the presence of parasites, or specific climatic conditions. The absence of these factors is often responsible for the explosion of a pest population when it is introduced into a new environment.

PRINCIPLES OF CONTROL

The strategies for plant and animal pest control depend upon the successful blending of many skills. Rarely does any single method prove successful for a sustained period of time unless supporting measures are soundly conceived. There are four basic strategies for protecting plants and animals from pests.

--prevention of entry
--eradication of infestation
--retardation of spread
--mitigation of losses

These strategies are evolutionary in concept; in practice, one is gradually replaced by the next.

PREVENTION OF ENTRY

Agricultural quarantine inspection programs at ports of entry are designed to prevent the introduction and establishment of plant and animal pests and diseases into the United States and its possessions. These inspection activities are

accomplished by inspection staffs at major air, sea, border and offshore ports. Inspectors work in cooperation with other border clearance agencies in the examination of passengers, their bags and means of conveyance. Cargoes of both agricultural and nonagricultural nature are also inspected. Treatments or other safeguards may be applied to insure that harmful pests do not cross borders. Certain hazardous agricultural products are prohibited entry when disinfestation means are not available. This is the case with passengers carrying certain fruits, vegetables and plants from the Virgin Islands to Puerto Rico or the mainland. Some of the prohibited items are cotton bolls, sugarcane, sweet potatoes, guavas, mangoes, soursops, sugar apples, West Indian cherries, cactus plants and soil.

ERADICATION

Once an introduction occurs and where effective tools are available, the immediate objective of the program is complete eradication of the pest species. Generally, all means available including applications of pesticides are made to achieve this objective.

RETARDATION AND MITIGATION

In cases where the pest has become firmly established and eradication is not feasible, the objectives are different, depending on the pest populations, damage being experienced and likelihood of long-distance spread. Quarantines, inspection, and chemical treatment or other appropriate measures are used to reduce the possibility of long-distance spread. In other areas where pest populations are high and damage is occurring, an integration of control measures may be used. Among these measures are:

--release of parasites and predators
--release of sterile males
--removal of host
--use of pesticides
--resistant varieties

METHODS OF CONTROL

The success of most regulatory programs depends upon many diverse but related factors among which is adequate pest control. As mentioned above, satisfactory control of a pest population must be maintained at the point of origin so that the potential long-distance spread is greatly reduced. Once an introduction occurs, the need for chemical control becomes essential. The implementation of chemical controls when pest populations are newly established and not widely distributed is both economically sound and biologically feasible.

The selection of the proper methods of control and suitable pesticides is based on many factors:

--pest species, life cycles, method of dispersal and mode of attack
--host species and location of infestation
--method of pesticide application
--formulation of pesticide
--mode of pesticide action
--size and location of areas selected for treatment
--effect of pesticide on target and nontarget organisms

PROPER PESTICIDE USAGE

Precautions should be taken to prevent accidental poisoning of livestock during pesticide applications. Avoid drift of pesticide sprays onto livestock and other domestic animals and pets. Do not allow poultry, dairy animals or meat animals to eat plants or drink water contaminated with pesticides.

AVOIDING HARMFUL RESIDUES

Residues in excess of the established legal tolerances can be avoided by applying only those pesticides specified for use on the crop or livestock and by following indicated schedules. Do not exceed recommended dosages. Observe the safety restrictions, particularly the required interval between the last application and harvest, feeding or slaughter.

In storages, apply only those pesticides registered for this purpose. A commodity which comes in contact with floors or walls treated with pesticides not registered for this use may become contaminated. Repeated applications of some fumigants will cause residues to build up in the commodities.

Consider the tolerance of a commodity for a pesticide that may modify taste, odor, appearance, ripening rate, viability or vitality.

ENVIRONMENTAL CONCERNS

Regulatory personnel have two basic responsibilities:

--to control regulated pests
--to protect nontarget species

Consideration should always be given to the best methods to control the regulated pests with a pesticide while minimizing its effect on nontarget species.

It should be made clear that environmental effects from pesticides are not necessarily deleterious. There are numerous examples where environmental benefits have been gained by the careful selection and judicious use of pesticides. In other situations, the use of pesticides can result in neutral or indeterminate impacts on the environment.

The effectiveness of any pest control program depends greatly upon proper planning and sound management of the pesticide application. All treatment areas must be kept as small as possible, and all sensitive areas--water, pasture land, residential areas, etc.--must be carefully avoided. Consideration must always be given to areas adjacent to the treatment sites. Continuous monitoring of weather conditions (wind, humidity, precipitation, etc.) should be carried out prior and during application. Care must be taken to avoid runoff of any pesticide and, where possible, all animals and birds should be excluded from the treated area. All standing bodies of water should be avoided insofar as possible.

PESTICIDES

The different classes of pesticides exhibit very different chemical properties. These differences are very significant when you are selecting the proper product for a specific application. The insecticidal properties of the compound may make it very desirable from a control standpoint. However, some other property may, from an environmental standpoint, make the choice unacceptable.

When choosing a product for a particular situation, all of the factors involved should be carefully considered from a risk/benefit standpoint.

Most restricted products that you will encounter will be either organochlorines, organophosphates, fumigants or herbicides.

ORGANOCHLORINES

Organochlorines contain the elements chlorine, hydrogen and carbon. Dieldrin, chlordane, endrin, mirex, toxaphene and D.D.T. are representatives of this group.

Organochlorines were first recognized for their pesticidal properties in the 1940's. These products have been invaluable as public health and agricultural pesticides. Unfortunately, one of their properties which makes them so valuable as a pesticide can have negative effects on the environment if application is not properly controlled. This property is commonly called "persistence". This means that when applied, these chemicals do not easily break down into less toxic substances. These products are therefore available to be picked up by nontarget organisms.

Accumulation of these chemicals can occur in fatty tissue of organisms and lead to buildups to toxic levels in animals further along the food chain.

Some insects have become resistant to organochlorines. This has led to a reduction of the use of these products in some areas.

Organochlorines act on the central nervous system in most organisms. They are effective contact and stomach poisons. These compounds are readily absorbed through the skin by humans. Aquatic organisms are extremely sensitive to most organochlorine insecticides. Oxygen uptake at the gills is impeded, and death can result from suffocation. Therefore, in agricultural applications, extreme care should be taken to avoid the contamination of water supplies with organochlorines.

ORGANOPHOSPHATES

The organophosphates are derived from phosphoric acid. Representatives of this group are parathion, malathion and diazinon. All of these compounds have a similar mode of action. They are cholinesterase inhibitors or nerve poisons. They are effective as contact and stomach poisons.

The organophosphate insecticides began in the middle 1960's to replace the organochlorine pesticides. There are three basic reasons for the transition to the use of organophosphate insecticides:

(1) They are effective against insects resistant to the organochlorine compounds.
(2) They are biodegradable and do not contaminate the environment for a long time.
(3) They have less long-lasting effects on nontarget organisms. Organophosphates, although often acutely toxic to mammals, have not presented a serious problem to aquatic life.

The primary danger from organophosphate insecticides is to the applicator himself.

These compounds are readily absorbed through the skin; the vapors are poisonous and should not be inhaled. Orally some of these compounds are acutely toxic.

The organophosphates exhibit a wide range of toxicity ranging from parathion which has an oral LD_{50} of approximately 5 mg/kg to malathion which has an oral LD_{50} of approximately 1400 mg/kg. Because of the wide range of toxicities of products belonging to this group, each product should be evaluated on its own merit.

HERBICIDES

Chemical weed killers have been in use since the early 1940's. The development of these products has been greatly responsible for the dramatic increases in agricultural production over the last thirty years.

There are many types of herbicides available today. They can be broadly classified as selective and nonselective herbicides. Both selective and nonselective products can be applied to foliage or to the soil.

Examples of selective herbicides are 2,4-D and 2,4,5-T. Both of these are effective on broadleaf weeds and are used in cereal production. (Cotton is highly susceptible to 2,4-D). These materials are generally referred to as "phenoxy" or "hormonal" herbicides. These products are translocated throughout the plant.

Contact herbicides are a separate group of pesticides. Some of these products are also selective on broadleaf weeds. They have a contact, burning action to plant tissue. Paraquat, another contact herbicide, is effective on broadleaf weeds and grasses. It is selective because of placement only.

Most of the foliage-applied herbicides are effective on actively growing plants and have no long-term action.

The soil-applied herbicides act mainly on weeds as they germinate and can be active for several months.

Herbicides generally have a low mammalian toxicity and do not present a hazard to the applicator. One exception to this is Paraquat which is extremely toxic if inhaled or ingested and for which there is no known antidote.

The greatest danger from using herbicides is the potential economic damage from drift to adjacent cash crops.

Most herbicides are broken down either chemically or biologically in the soil. Foliage-applied herbicides are broken down rapidly, and even persistent soil-applied herbicides disappear within a few months under most conditions. Soils of high organic or clay content can delay breakdown.

Research data gathered in recent years indicates that herbicide residues do not build up to unacceptable levels as a result of repeated annual applications.

FUMIGANTS

Fumigants are gases that kill body cells and tissues. They generally enter an organism through the respiratory tract and, in some cases, can penetrate an insect's body wall.

Fumigants are available in solid, liquid or gaseous form. They are active in gaseous form. The gases (molecules) penetrate cracks and voids in materials infested by insects.

The utilization of fumigants is limited by the following factors:

(1) Flammability - Some fumigants must be mixed with nonflammable materials to render them safe for use.
(2) Toxic hazards to applicators - Fumigants potentially present a greater danger to applicators than any other pesticides.
(3) High reactivity - They present a problem of poisonous residues and residual odors in food.
(4) Tendency to corrode metals.
(5) Lack of chemical stability.
(6) Cost

All fumigants that are effective pesticides are toxic to man. Therefore, it is necessary to add warning agents (dyes or odors) to compounds that are naturally colorless or odorless.

No fumigant should ever be used unless it has these warning additives and the applicator is thoroughly familiar with fumigant application.

When taking part in a fumigation activity, do not begin actual fumigation until you are positive that the area is secure and adequate measures have been taken to protect nonparticipants.

SPECIAL SITUATIONS

Although it is a violation of FIFRA regulations to use a pesticide in a manner inconsistent with the labeling, there are special emergency provisions. When a new pest is introduced into the country, a pesticide is not likely registered to combat it since it will not be specifically mentioned on the label. Section 18 (FIFRA) as amended, provides authority for the EPA administrator to exempt any

federal or state agency from any provision of FIFRA if he determines an emergency exists. These are the types of exemptions defined by EPA regulations:

--Specific exemption: This involves outbreak of pests and must be requested in writing by the head of a federal agency or the Governor.

--Quarantine: May be issued for federal or state programs to prevent the introduction or spread of a foreign pest on a similar written request.

--Crises exemption: Situation involving an unpredictable pest outbreak where need is so critical as to preclude application for a specific exemption.

Such exemptions may not involve use of any pesticide which has been suspended or cancelled for the use in question.

In situations of a highly localized nature, consideration may be given to obtaining registration for "special local needs" through the Iowa Department of Agriculture.

AND JUSTICE FOR ALL

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